

ORIGINAL RESEARCH

Comparative Analysis of Caudal, Transforaminal and Interlaminar Routes in Management of Lumbar Prolapsed Intervertebral Disc at a Tertiary Care Centre

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ABSTRACT

Background: Lower back pain (LBP) is one of the most common presenting complaints globally. The intervertebral discs consist of an inner nucleus pulposus (NP), outer annulus fibrosus (AF), and the cartilaginous endplates that anchor the disc to its vertebrae. This study was conducted for the comparison of caudal, transforaminal and interlaminar routes in management of lumbar prolapsed intervertebral disc. **Materials and Methods:** This study comprised of 90 subjects with lumbar prolapsed intervertebral disc. The subjects had been informed about the procedure and were asked for consent. The subjects who were willing to participate and give consent had been included in the study while those who were not willing to give consent and participate had been excluded. The subjects were managed through caudal, transforaminal and interlaminar routes and the comparison of the three routes was carried out. The subjects had been divided into three groups based on these routes as group 1, 2 and 3 respectively. Statistical analysis had been conducted using SPSS software. **Results:** There were total 36 males and 54 females in this study. Group 1 had 14 males and 16 females. Group 2 had 12 males and 18 females whereas Group 3 had 10 males and 20 females. The highest average score had been observed at 6 months after injection for all three groups. Also, the transforaminal group showed the best outcomes with 28 patients showing excellent, 32 showing good, 20 showing fair and 10 showing poor rate of improvement. **Conclusion:** The highest average score had been observed at 6-month after injection for all three groups. Also, the transforaminal group showed the best outcomes with 28 patients showing excellent, 32 showing good, 20 showing fair and 10 showing poor rate of improvement.

Keywords: Caudal, Transforaminal, Interlaminar, Route, Prolapsed Disc.

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INTRODUCTION

Lower back pain (LBP) is one of the most common presenting complaints globally, as approximately 80% of the population sustains an episode once in their lifetime. This highly prevalent and disabling ailment costs more than \$100 billion annually in the United States. Among the many differential diagnoses of LBP, degenerative disc disease and lumbar disc herniation (LDH) are the most common.

Approximately 95% of disc herniations in the lumbar area occur at L4-L5 or L5-S1.¹

The lumbar spine contains five vertebrae and intervertebral discs, producing a lordotic curve. The intervertebral discs with the laminae, pedicles, and articular processes of adjacent vertebrae create the space in which the spinal nerves exit.² The intervertebral discs consist of an inner nucleus pulposus (NP), outer annulus fibrosus (AF), and the

cartilaginous endplates that anchor the disc to its vertebrae.

The nucleus pulposus is a gel-like structure that is composed of approximately 80% water, with the rest made by type 2 collagen and proteoglycans. The proteoglycans include the larger aggrecan, which is responsible for retaining water within the nucleus pulposus. Also, it provides versican that binds to hyaluronic acid. This hydrophilic matrix is responsible for maintaining the height of the intervertebral disc.

All kind of conservative and surgical treatments have been used with varying success. Non-surgical treatment of chronic low back pain covers a wide range of alternatives including conventional physiotherapy, manipulations and other manual methods of traction. These conservative methods throw a considerable burden on general practitioners, surgeons and hospital outpatient department.^{3,4} Surgical treatment in the form of excision has its own disadvantages like persistence of back pain, infection, postoperative adhesions and mechanical instability. Solberg et al., in their study, reported a 4% risk of worsening of symptoms after a lumbar discectomy.⁵ This study was conducted for the comparison of caudal, transforaminal and interlaminar routes in management of lumbar prolapsed intervertebral disc.

MATERIAL AND METHODS

This study comprised of 90 subjects with lumbar prolapsed intervertebral disc. The subjects had been informed about the procedure and were asked for consent.

The subjects who were willing to participate and give consent had been included in the study while those who were not willing to give consent and participate had been excluded. The subjects were managed through caudal, transforaminal and interlaminar routes and the comparison of the three routes was carried out. The subjects had been divided into three groups based on these routes as group 1,2 and 3 respectively. Statistical analysis had been conducted using SPSS software.

RESULTS

There was total 36 males and 54 females in this study. Group 1 had 14 males and 16 females. Group 2 had 12 males and 18 females whereas Group 3 had 10 males and 20 females. The highest average score had been observed at 6-month after injection for all three groups.

Also, the transforaminal group showed the best outcomes with 28 patients showing excellent, 32 showing good, 20 showing fair and 10 showing poor rate of improvement.

Table 1: Gender-wise distribution of subjects.

Group	Number of males	Number of females
Group 1	14	16
Group 2	12	18
Group 3	10	20
Total	36	54

Table 2: Improvement in JOA score.

Route	Pre-injection	At 1 month	At 6 months	At 1 year
Caudal	14.23	16.25	17.28	16.06
Transforaminal	15.24	17.68	18.56	19.04
Interlaminar	13.25	14.14	18.02	16.77
p-value	0.787	0.758	0.319	0.001*

*: Significant

DISCUSSION

Epidural steroid injections are a safe and effective treatment for acute low back pain associated with radicular pain; the best available evidence is for acute intervertebral disc herniation pathology, though other pathology such as spondylitic stenosis or non-specific pack pain have also been studied.⁶⁻⁹ Transforaminal and interlaminar epidural steroid injections work, in theory, by delivering a corticosteroid in close proximity to the site of nerve root compression and inflammation.

While both approaches deliver corticosteroid to the epidural space, differences in approach may result in different medication flow patterns. Specifically, the transforaminal approach is theorized to better deliver medication to the ventral epidural space which is the most common location of certain pathology such as

intervertebral disc herniation. Neural compression may also occur at or near the neural foramen, for which a transforaminal approach has also been hypothesized to be the most direct and efficacious route for medication delivery.¹⁰ This study was conducted for the comparison of caudal, transforaminal and interlaminar routes in management of lumbar prolapsed intervertebral disc.

There was total 36 males and 54 females in this study. Group 1 had 14 males and 16 females. Group 2 had 12 males and 18 females whereas Group 3 had 10 males and 20 females. The highest average score had been observed at 6 months after injection for all three groups. Also, the transforaminal group showed the best outcomes with 28 patients showing excellent, 32 showing good, 20 showing fair and 10 showing poor rate of improvement. Pandey RA et al¹¹ studied the

efficacy of epidural steroid injection in the management of pain due to prolapsed lumbar intervertebral disc and to compare the effectiveness between caudal, transforaminal and interlaminar routes of injection. A total of 152 patients with back pain with or without radiculopathy with a lumbar disc prolapse confirmed on MRI, were included in the study and their pre injection Japanese Orthopaedic Association (JOA) Score was calculated. By simple randomization method (picking a card), patients were enrolled into one of the three groups and then injected methyl prednisone in the epidural space by one of the techniques of injection i.e. caudal, transforaminal and interlaminar. Twelve patients didn't turn up for the treatment and hence were excluded from the study. Remaining 140 patients were treated and were included for the analysis of the results. Eighty-two patients received injection by caudal route, 40 by transforaminal route and 18 by interlaminar route. Post injection JOA Score was calculated at six month and one year and effectiveness of the medication was calculated for each route. The data was compared by LSD and ANOVA method to prove the significance. Average follow-up was one year. At one year after injecting the steroid, all three routes were found to be effective in improving the JOA Score (Caudal route in 74.3%, transforaminal in 90% and interlaminar in 77.7%). Transforaminal route was significantly more effective than caudal ($p=0.00$) and interlaminar route ($p=0.03$) at both 6 months and one year after injection. No significant difference was seen between the caudal and interlaminar route ($p=0.36$). The management of low back pain and radicular pain due to a prolapsed lumbar intervertebral disc by injecting methyl prednisone in epidural space is satisfactory in the current study. All three injection techniques are effective with the best result obtained by transforaminal route.

CONCLUSION

The highest average score had been observed at 6-month after injection for all three groups. Also, the transforaminal group showed the best outcomes with 28 patients showing excellent, 32 showing good, 20

showing fair and 10 showing poor rate of improvement.

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